User’s Manual

Smart-OTDR

Optical Time Domain Reflectometer

Preface

Thank you very much for purchasing and using this series of optical time domain reflectometers. This manual mainly contains information on common operation safety instructions, basic operations and specifications of the instrument, as well as common troubleshooting guides. For your convenience, before operating this instrument, please read this manual carefully and follow the instructions in the book correctly.

This manual is only for use with this instrument. Without the authorization of the company, any unit or individual shall not tamper, copy and disseminate the contents of this manual for commercial purposes.

The contents of this manual are subject to change without notice. If you have any questions, please call the supplier and we will be happy to provide you with the best service!

Contents

1.Overview

1.1 Instrument Unpacking Inspection

This instrument is packaged and transported in strict accordance with GB/T 9174-2008 "General Technical Conditions for General Cargo Transport Packaging". When you receive this instrument, please carefully check the product according to the packing list and check the appearance quality of the product, so as to find out the possible damage to the product during the shipping process. If any damage to the packaging is found, please notify the shipping company immediately while keeping the original packaging materials, and contact the supplier of this product for a solution.

In the product packaging, there are adapters, analysis software and instruction manuals, etc., see the packing list for details. After receiving the instrument, please check the integrity of the instrument packaging as soon as possible. If you find that the materials in the packaging box are not complete, please contact the agent who supplied you in time to solve it.

1.2 Product Description

This series of optical time domain reflectometers (OTDR) includes functional modules: OTDR, event map, optical power meter, visible light source, stable light source, loss test,the main It is used to measure the length, loss, connection quality and other parameters of various optical fibers and cables; it can quickly

⚠ and accurately locate the event points and fault points in the optical fiber link. It can be widely used in engineering construction, maintenance testing and emergency repair of optical fiber communication systems; development and production measurement of optical fibers and optical cables. This product can provide you with the highest performance solution in the installation and construction of optical fiber network construction, or in the follow-up fast and efficient maintenance and troubleshooting test.

The instrument adopts the double operation mode of button and touch, which greatly simplifies the use of users; the unique high-precision analysis algorithm can quickly obtain test results; the whole machine adopts intelligent power management mode, and the large-capacity lithium battery makes the whole machine work time. Up to 10 hours or more, very suitable for long-term field use.

1.3 Safety Warning

External power supply

⚠ The power adapter input meets the following requirements: 100V～240V, 50/60Hz; @0.5A.

The power adapter output meets the following requirements: 12V~19V，＞1.0A.

Please use the standard power adapter of this instrument for charging, and do not use other adapters arbitrarily to avoid damage to the equipment !

Internal battery

⚠ Inside the instrument is a dedicated lithium battery. Only use the special battery for this instrument, do not use the battery for other instruments, only use this instrument to charge the battery. For safe use, the internal charging circuit of the instrument has set multiple protection measures for battery voltage, charging current, and charging temperature. The charging temperature range of the internal battery is -5℃～40℃. When the ambient temperature is too high, the charging will be automatically terminated. When the instrument is not used for a long time, please charge the battery regularly. It is recommended to charge the battery every 2 to 3 months to ensure the best performance of the battery.

Please do not let the battery close to fire or strong heat; do not open or damage the battery; when the instrument is stored for a long time, the battery should be removed. The temperature range of the battery during long-term storage is: -20℃～45℃.

If the battery leaks or explodes, the electrolyte will damage clothing or skin it has come in contact with. Electrolyte may cause blindness. If it accidentally gets into your eyes, please wash your eyes thoroughly with clean water and seek medical attention immediately.

Laser Safety

When using the instrument, please avoid looking directly at the laser output port, and do not look directly at the end of the optical fiber during testing; when the instrument is used, please cover the light

output port dust cap.

Apply light to the optical connector: Do not apply -5dBm or stronger light to the optical connector of OTDR port, otherwise the instrument will be damaged. Do not apply +10dBm or stronger light to the OPM port, otherwise the OPM port will be damaged; Do not apply +27dBm or stronger light to the high-power OPM port, otherwise the OPM port will be damaged.

LCD screen: The display screen of this series of instruments is a 5.0-inch color LCD with a touch screen. In order to maintain a good viewing effect, please keep the LCD screen clean. When cleaning, wipe the LCD screen with a soft cloth.

Hint: Do not press the LCD screen with sharp objects, and do not wipe the LCD screen with organic solvents, otherwise the LCD screen may be damaged.

During the use of the instrument, it is strictly forbidden for the user to disassemble the machine without permission, otherwise the warranty will be lost!

1.4 Instrument Repair And Return

The whole machine is guaranteed for 18 months, and the power adapter, battery, and optical interface consumables are guaranteed for 6 months. The items presented with the product are not within the scope

of this warranty. For specific warranty terms, please refer to the warranty description in the "After-sale Service Warranty Card". When the product needs to be returned to the factory, please contact your supplier in advance, and briefly explain the reason for the return of the product, so as to provide you with more timely and effective services.

When returning the product, please note:

- Use a soft thin pad such as polyethylene to wrap the instrument to protect the integrity of the instrument shell;
- Please use a hard packing box to ensure that at least 3 cm thick soft material is filled around the instrument;
- Fill in the product after-sales service warranty card correctly, including company name, address, contact person, telephone number, problem description and other information.
- Reliable shipping to the agent who supplies you.

2.Introduction To The Basics Of OTDR

OTDR is a precision optical fiber measuring instrument made by using the principle of backscattering generated by Rayleigh scattering and Fresnel reflection when the laser is transmitted in the optical fiber. L=c × t/(2n) Calculate the distance L, c is the propagation speed of light in vacuum 2.99792 × 108m/s, t is the return time of the light pulse, n is the group refractive index (specified by the fiber manufacturer), divided by 2, because the measured is the round-trip time.

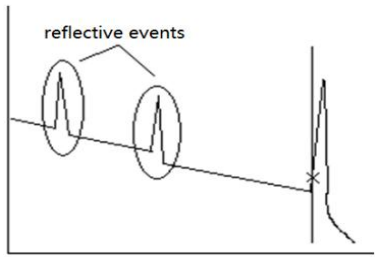
When light is transmitted in the optical fiber, due to the in-homogeneity of the optical fiber doping composition or the defects of the optical fiber link itself, the optical pulse propagating in the optical fiber undergoes Rayleigh scattering, and part of the optical signal will be scattered in the opposite direction of the pulse incidence. Back, it is called back Rayleigh scattering. By regularly observing the changes of Rayleigh back-scattered light signal intensity, the loss distribution and connection quality of optical fibers and cables can be accurately measured.

According to the light transmission theory, when light encounters the boundary of two transmission media with different refractive indices (such as a flexible connector, a break or an optical fiber termination) during the propagation process, the Fresnel reflection phenomenon will occur. Timed reception of the Fresnel-reflected signal enables accurate location of discontinuities along the length of the fiber. The

magnitude of the reflection depends on the refractive index difference and the flatness of the boundary surface.

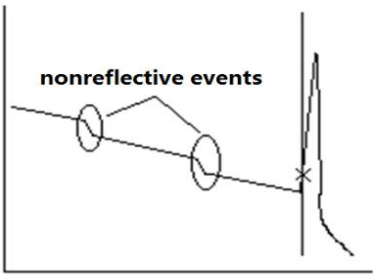
An OTDR-tested event is an anomalous point that causes a sudden change in loss or reflected power. Including various connection points, fusion points, and bending, cracking or breaking positions in the optical fiber link that cause the loss of transmission signals. The events tested by OTDR are mainly divided into two categories: reflective events and non-reflective events.

2.1 Reflection Event



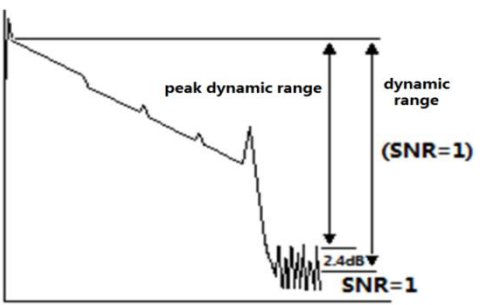
When the laser pulse sent by the OTDR is transmitted along the fiber under test, if it encounters an active connection point or the end of the fiber a reflection phenomenon will occur due to the sudden change of the refractive index, and part of the optical signal will return to the instrument along the fiber under test. The instrument will detect this reflection event by accepting this reflection signal. On the OTDR test curve, it appears as an upward spike signal with a certain width. The width and amplitude of the spike are mainly determined by the pulse width used for the test and the reflection intensity that occurs.

2.2 Non-reflective Events



When the laser pulse emitted by the OTDR is transmitted along the fiber under test, if it encounters a position where the energy is partially lost, such as a fusion point or bending, the reflection phenomenon will not occur because there is no sudden change in the refractive index , or can be ignored. The OTDR detects the energy change difference entering the OTDR receiver through back-scattering, and can detect the non-reflection event parameters at this point. A non-reflection event appears as a signal with a drop in energy on the OTDR test curve, and the magnitude of the drop indicates power loss.

2.3 Dynamic Range



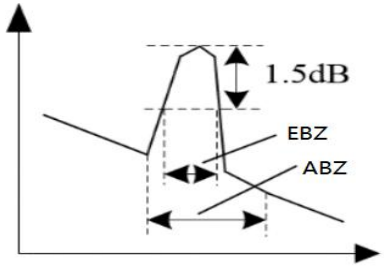
The dynamic range is an important parameter of optical time domain reflectometer, which takes dB as unit. This parameter is expressed as the maximum optical loss that OTDR can analyze when the backscattering level from the output port of the instrument is reduced to a specific noise level. In the actual use of OTDR, this parameter is usually measured by the farthest fiber link

distance that OTDR can test under the condition of the maximum test pulse width provided by the instrument. Therefore, under the same link condition, the larger the dynamic range, the longer the distance of the optical fiber link that the instrument can test.

The maximum test distance of OTDR is different in different applications, because the loss of the link under test is different. Connectors, fuses and spectrometers are also factors that reduce OTDR test length.

2.4 Event Blind Zone And Attenuation Blind Zone

Due to the influence of connection points or connectors, some parts of the link cannot be measured. OTDR blind area is divided into event blind area and attenuation blind area, which are generated by Fresnel reflection and expressed by the distance (m) which varies with the reflection power.

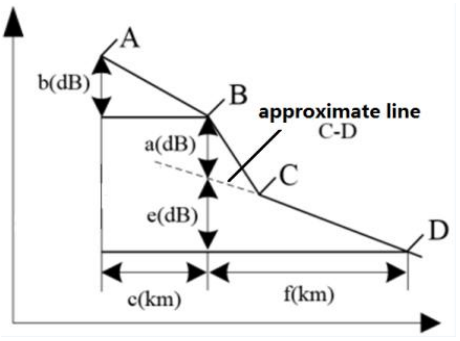


Event Blind Zone: The shortest distance between the detection of Fresnel reflection signal and the recognition of the next Fresnel reflection signal by OTDR is defined by the pulse width less than 1.5dB of the peak value.

Attenuation Blind Zone: The shortest distance that OTDR goes through from detecting Fresnel reflection signal to normal testing backward Rayleigh scattering signal, that is, the phase cannot measure fusion loss due to adjacent large reflection.

2.5 Splice Loss

OTDR tests distance and loss between specified points. This series of OTDR mainly use four-point marking method:



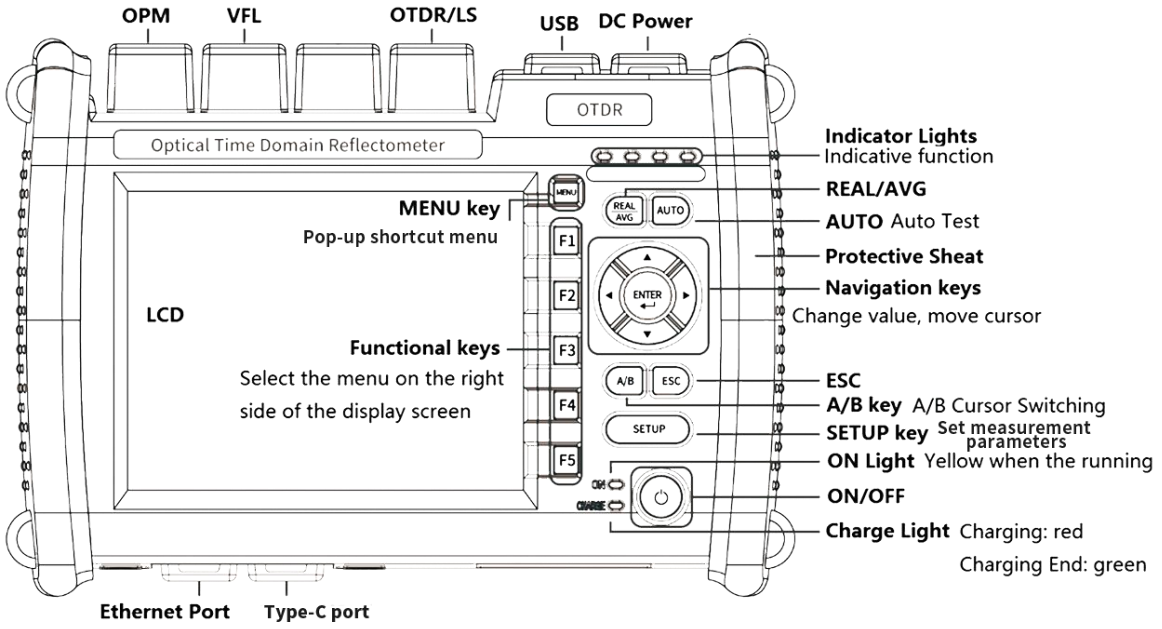
Measurements are performed at four points: starting point A, starting point B, ending point C and ending point D. The weld loss is calculated by the level difference of the mark B of the approximate line between B-A and C-D. Please set mark B in the correct position. The weld loss depends largely on the location of B. The measured loss between tags depends on the approximation method specified.

2.6 Return Loss (RL)

RL is the ratio of reflected light Pr to incident light Pi in dB. Using the formula RL=-10log (Pr/Pi), the greater the echo loss, the smaller the reflected light energy, indicating that the better the measured light path.

3.Basic Operation And Usage Of OTDR Series

3.1 Front Panel, Top Panel And Bottom Panel



3.2 ON/OFF

Press the power switch on the front panel of the instrument for more than 1 second. If the instrument starts normally, the ON indicator lights up and the main screen is displayed. If the adapter is connected and the battery is being charged, the CHARGE LED will light red, and when the battery is fully charged, the CHARGE LED will light green.

The battery level will be displayed at the top of the screen. When the battery level is too low, a warning message will appear. Please use the supplied adapter to connect the instrument to the power outlet and charge it.

3.3 Connect The Fiber Optic Cable

⚠ Warning

Light is emitted from the OTDR port of this instrument. Do not unplug the connected fiber optic cable, if the light enters the eyes, it may hurt the eyes.

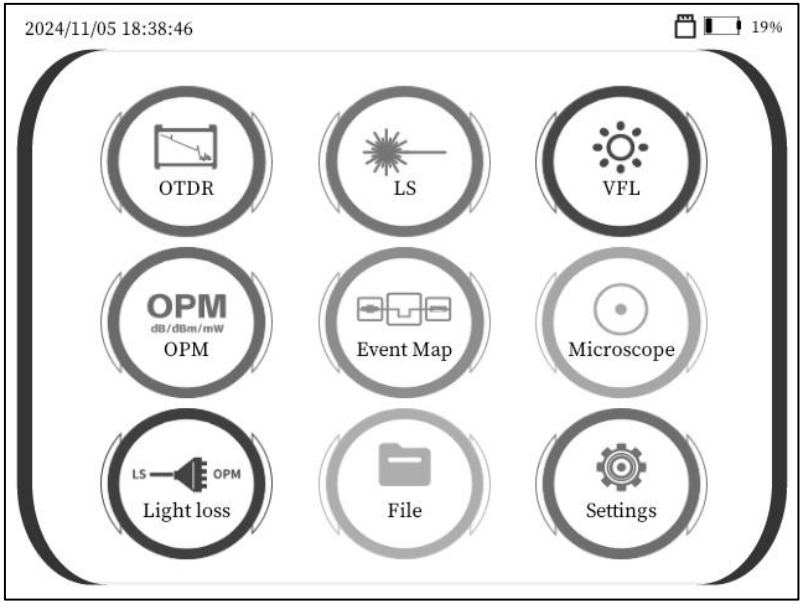
Notice:

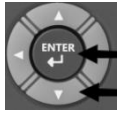
- Before connecting the optical cable connector, please confirm whether the connector type matches and whether the connector is clean. The wrong connector type or contaminated connector will not only lead to inaccurate measurements, but may even damage the optical interface of the instrument. The

correct way to clean the end face is: before inserting the optical fiber connector (jumper), use anhydrous alcohol to clean the jumper, especially the end face, and connect it to the instrument after the alcohol evaporates.

- When connecting the optical cable connector, it should be inserted into the optical port vertically and slowly. If it is turned to the left, right or too hard, the optical connector or the optical port will be damaged.
- If there is no optical cable connected to the port, immediately cover the dust cover to prevent dust or other dirt from adhering to the optical output port of the instrument.

3. 4 **Instrument Main Menu**



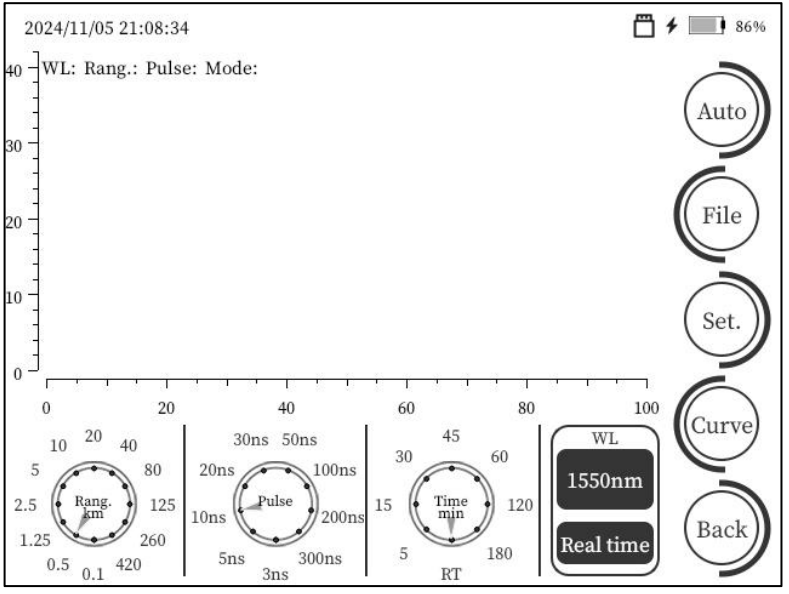
After turning on this instrument, the main screen will be displayed first. The main screen has a standard display. When using various functions of this instrument, first select the function from the main screen, and then perform relevant settings or measurements. Press the function icons on the main screen to enter the corresponding functions.By pressing the button 

you can select the corresponding function and press 【 ENTER 】 to open it.

3. 5 OTDR Function And Operation

3. 5. 1 Quick Parameter Setting

Correctly setting the parameters of the instrument is a necessary condition for accurate measurement. Therefore, before using this instrument, the parameters must be set as required. Standard tests only need to set the wavelength, range, pulse width, measurement time, and measurement mode on the main interface of the OTDR.



Wavelength (nm): Used to set the test wavelength of the OTDR

Setting method: On the main interface of the OTDR, click [Wave], and drag [1310nm], [1550nm] or [1310/1550nm] to the center frame.

Range (km): Set the range of the scanning track.

The setting of the range is to select the corresponding pre-defined range according to the actual length of the fiber, which must be greater than the length of the fiber to be tested, usually set to about twice the length of the fiber to be tested. The longer the distance, the longer the test time.

Pulse width (ns)： Set the laser pulse width from the instrument.

The pulse width setting will change with the distance setting. This series of OTDR has simplified the test pulse width for various length ranges, which greatly facilitates the operator's selection process. In actual operation, it is recommended to use the upper limit pulse width of the optional range.

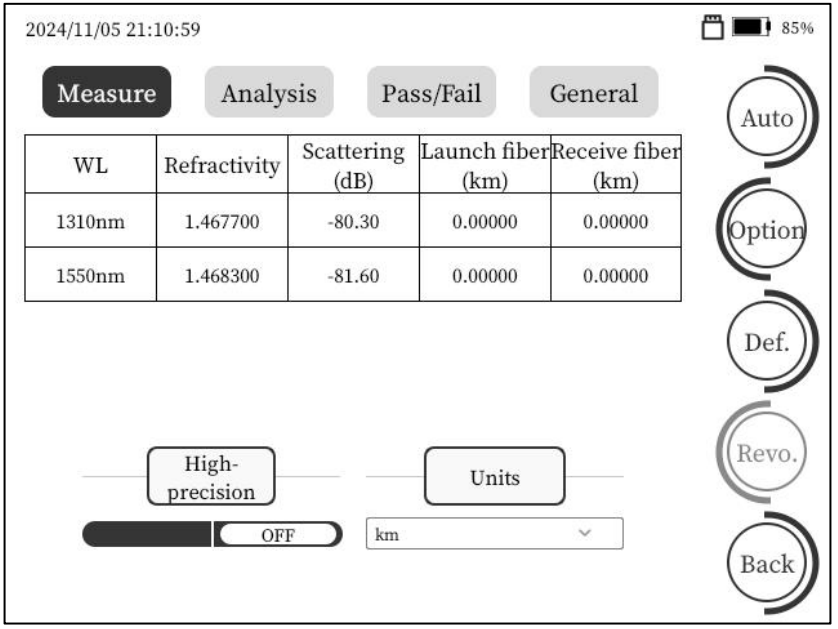
Measurement time (s): In the "Average Test" and "Auto Test" modes, it is used to set the average processing time of the test. Does not work in "Real Time Test" mode. The setting range is between 5 and 300 seconds.

Measurement mode： Used to select how the OTDR scans events, including "Auto" and "Manual" modes.

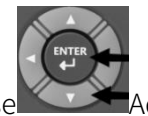
Automatic mode: Intelligent test method. In this mode, the automatic test is performed, and the instrument will automatically match the test conditions according to the link under test, without the need for the user to manually set parameters.

Manual Mode: You can choose between average testing or real-time testing. The real-time test is to scan the link under test in real time, and display the test results of each time, which can realize the dynamic

monitoring of the link and the status before and after the connection. The average test is to accumulate and average the scan results of multiple times to further improve the quality of the test curve and the test accuracy.



Button measurement/parameter setting:

Enter OTDR function, press the 【 SETUP 】 button to enter OTDR quick settings;use 

Adjust parameter options;

Press 【 REAL/AVG 】 to perform real-time/average testing (test conditions are the same as the last test);

Automatic testing can be performed through AUTO.

3.5.2 Advanced Parameter Settings

Advanced parameter setting includes quick parameter setting parameters, which are used when further parameters need to be set. Standard tests only need to set the wavelength, range, pulse width, measurement time, and measurement mode on the main interface of the OTDR.

1) Measurement parameters

Refractive index: The refractive index of the optical fiber affects the transmission speed of the laser in the optical fiber, so whether the refractive index value is set accurately or not directly affects the accuracy of the distance measurement. The optical fiber refractive index parameter is provided by the optical fiber manufacturer.

Setting method: In the parameter setting interface, select [Refractive Index], click the refractive index of the wavelength to be changed, the refractive index input interface will pop up, enter the refractive index of the fiber under test, and press [Enter] to exit the window.

Unit: Select the length unit of the currently displayed curve, including kilometers (km), thousand feet (kft), and miles (mi).

Guide optical cable: Set the length of a section of optical fiber connected from the output port of the device, and use the tail end of the guide optical cable as the starting position of the curve to calculate and

display various information of the curve (default 0.0000km, not set).

Receive fiber optic cable： Set the length of a section of fiber at the end of the fiber under test, and use the head end of the received fiber cable as the end position of the curve to calculate and display various information of the curve (default 0.0000km, not set).

Sampling mode: According to the test sampling time and sampling accuracy, it is divided into 4 types: regular resolution regular sampling, regular resolution fast sampling, high resolution regular sampling, and high resolution fast sampling. Defaults to regular resolution regular sampling. The higher the resolution, the longer the test time

2）Analysis parameters

Event loss threshold: It is used to set the loss threshold of the connection point, splice point or macro-bend in the link that the OTDR can test. When analyzing the link under test, events larger than the event threshold will be listed in the event table, and events smaller than the event threshold will be ignored.

Reflection threshold: It is used to set the loss threshold of the link reflection events that the OTDR can test.

End threshold: used to set the loss threshold of the end of the link that the OTDR can test. The range is

between 1 and 30, and the default is 10.

The threshold value is generally selected to be automatic.

3) Eligibility criteria

Connection loss: It is used to set the threshold for passing the judgment of the loss of the connection joint. If the threshold is exceeded, it is considered that the loss of the connection joint is too large and the judgment is not passed.

Splice loss: used to set the threshold for judging the position loss of the splice point. If the threshold is exceeded, it is considered that the loss of the splice point is too large and the judgment is not passed.

Bending loss: It is used to set the threshold for passing the bending loss judgment. If the threshold is exceeded, it is considered that the bending point loss is too large and the judgment is not passed.

Link loss: used to set the threshold for passing the overall link loss judgment. If the threshold is exceeded, the entire link loss is considered too large and the judgment is not passed.

Average loss: It is used to set the threshold for passing the average loss of the link. If the average loss exceeds the threshold, the average loss of the link is considered to be too large and the judgment is not passed.

Incoming light detection: Set whether to judge the optical information of the fiber under test.

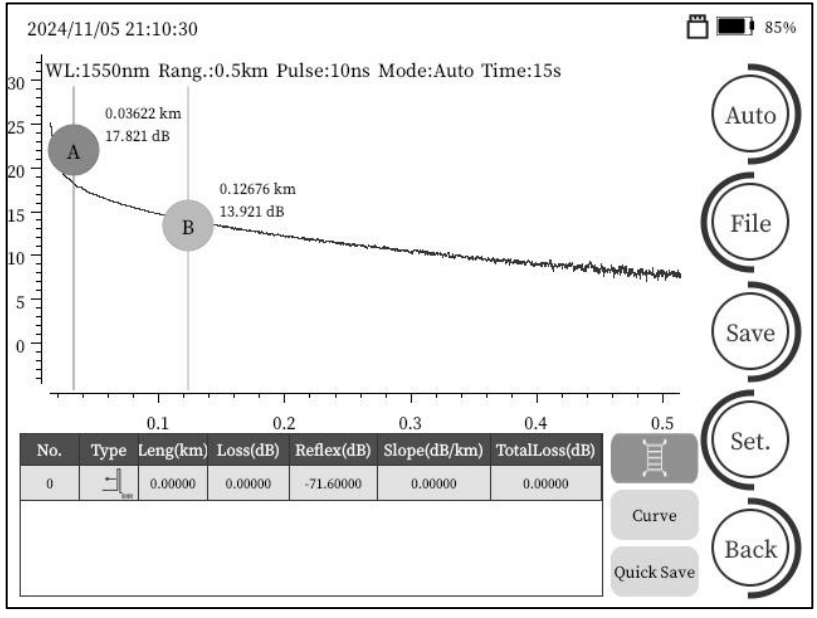
4）Save Settings

File naming method: used to set the naming method of the file during automatic saving

Auto save: whether to enable the function of automatically saving the file after the curve test is completed.

File name: The default naming method for manually saving sor data files.

Fiber Number: Set the fiber number of the currently tested fiber.



3. 5. 3 **Start Measurement**

Automatic testing: Only the wavelength needs to be set, and the test can be started through the 【 AUTO 】 key or 【 Auto Test 】 in automatic measurement mode. No other settings are required.

Real time testing: Set the measurement mode to manual, set the wavelength, range, and pulse width, and click [Real time testing] to start the test.

Average Test: Set the measurement mode to manual, set the wavelength, range, pulse width, and measurement time, and click [Average Test] to start the test.

3.5.4 View Event Analysis Results

After the OTDR test is completed, the loss distribution trace of the fiber link under test is obtained, and the event points are screened and located according to the set event threshold, and the length, loss, average loss and other information of the fiber link are obtained. At the same time, the event point information is displayed in the event list column of the OTDR operation window. At this time, by pressing the event list, or pressing the ▲ or ▼ key in the navigation key, you can view the information of all event points in the event list one by one.

In the event list window:

Event type: the event type of the current event point.

（1）Fiber start point: Indicates that this event is the start position of the fiber under test;

（2）  : Drop event: Indicates that this event point is a non-reflection event point in the middle of the optical fiber link, usually an event caused by a fusion point, fiber bending or extrusion, etc.;

(3)  : Rising event: Indicates that this event point is a non-reflection event point in the middle of the optical fiber link, usually an event generated by testing different types of optical fibers;

(4)  : Reflection event: Indicates that this event point is a reflection event point, usually an event caused by an active connector in an optical fiber link;

(5)  : Fiber end: Indicates that the event point is the end of the fiber.

Distance (km): the distance to the current event point;

Section (km): the distance between the current event and the previous event;

Loss (dB): The loss at the event point location in the fiber link;

Total loss (dB): the total loss of the link from the starting point to the current event point in the link;

Slope (dB/km): the average loss at the current event point;

Reflectance (dB): The reflectance loss at the current event point.

3.5.5 Trace Operation

3.5.5.1 Move And Switch Markers

You can move left and right by pressing key ◀ / ▶ of the navigation key or by dragging the A/B marker line. Menu [A/B] or key [A/B] to switch AB marking line. When the or key is held down continuously, the marker line can move quickly. Release the or key, the marker line stops moving.

3.5.5.2 Trace Scaling

After test or the data is loaded, drag the trace at a single point to follow the movement; Two-point touch controls the scaling of the trace. Double-click the trace area or click [1:1] to restore the trace to the original scale display.

3. 5. 5. 2 Switch event Map

After the test is completed, click  you can switch between displaying event maps and lists.

3.5.6 File Operations

3.5.6.1 File Save

The storage format of this series of OTDR test traces is based on the SR-4731 standard terms of the Bell Communication Research Center, and the file extension is sor.In the OTDR main interface, select the [Save] picture button below the trace, and the data file saving interface will pop up, enter the corresponding file name, and press the [Save] button to save.

3.5.6.2 File Open

In the OTDR main interface, select the [Open] picture button below the trace to enter the file open interface. Select the path where the file is located, select the file, and press the [Open] menu to open the

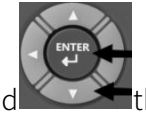
selected file. Support multi-file opening and file renaming functions.

3.5.6.3 File Deletion

On the OTDR file list interface, select the file and press the [Delete] menu to delete the selected file. Click [MultiSel] to select multiple files, and under [MultiSel], you can use [SelectAll] to select all files in the current directory.

Tip: Please use the delete all function with caution, the data cannot be recovered after deletion!

3.5.6.4 File Transfer

In the file management interface, select the file as above, click [Copy], and then go to the USB drive directory to paste and copy the selected file to an external USB drive. Through [F1] - [F5] and 

the above operations can be completed.

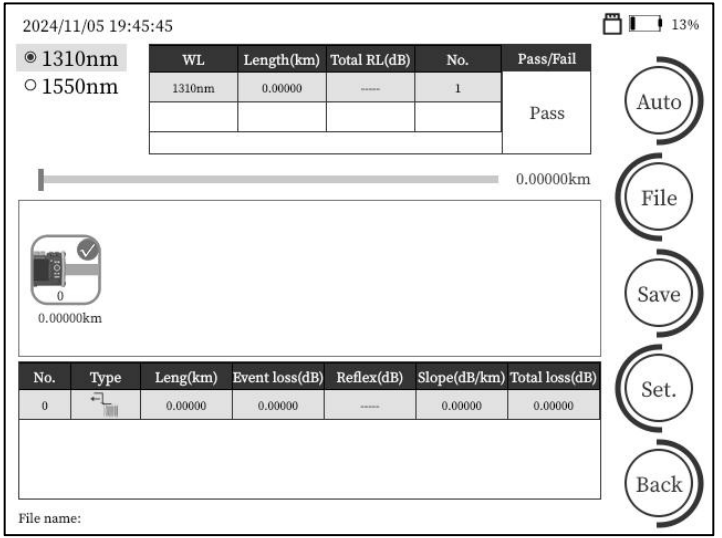
Tip: To shorten your copying time, when the number of copied traces is less than 500, you can directly copy to a USB flash drive; When the number of copied traces is greater than 500, connect to the computer through a data cable for copying!

3.6 Event Map

On the main menu interface, press the [Event Map] icon to enter the event map interface.

Click to select the test wavelength (multiple wavelengths can be selected), click [Start Test] to proceed.

After the test, the link test trace is displayed and all event information in the link is displayed in the list. Link information displays test wavelength, fiber link length, total link loss, and number of events. Sections and loss values that do not pass the judgment threshold are displayed in red.



 : Start-end instrument diagram;  : Fiber splicing point;  : Fiber optic splitter ;  : Illustration of connectors, such as square flanges, circular adapters, SC, ST, LC connectors, etc.;  : Optical fiber macro-bend;  : Illustration of fiber end.

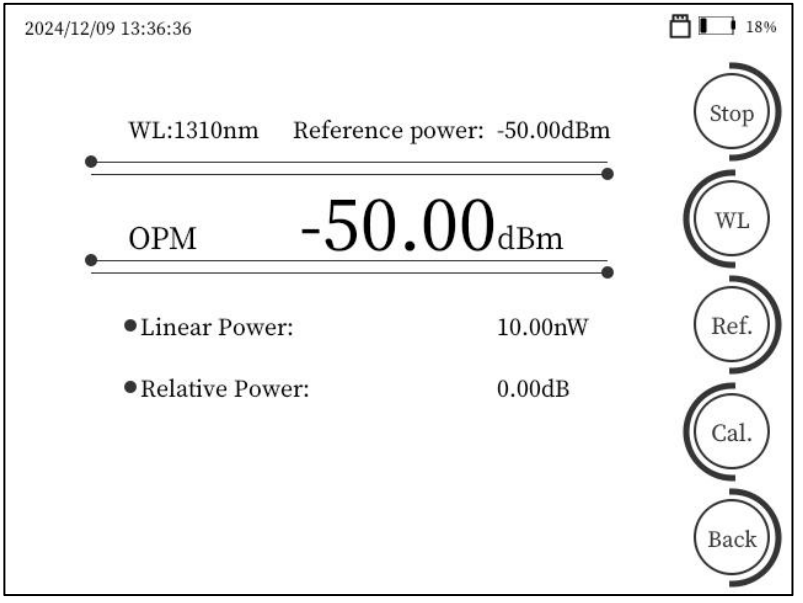
3.7 Optical Power Meter (OPM)

On the main menu interface, press the [OPM] icon to enter the optical power meter test interface.

Connect the measured optical signal to the OPM optical interface through the fiber jumper, select the test wavelength, and start the power measurement. Absolute power, relative power and linear power values are converted as follows:

Pabs=10lgPlin/1mW

Prel=Pabs-Pref



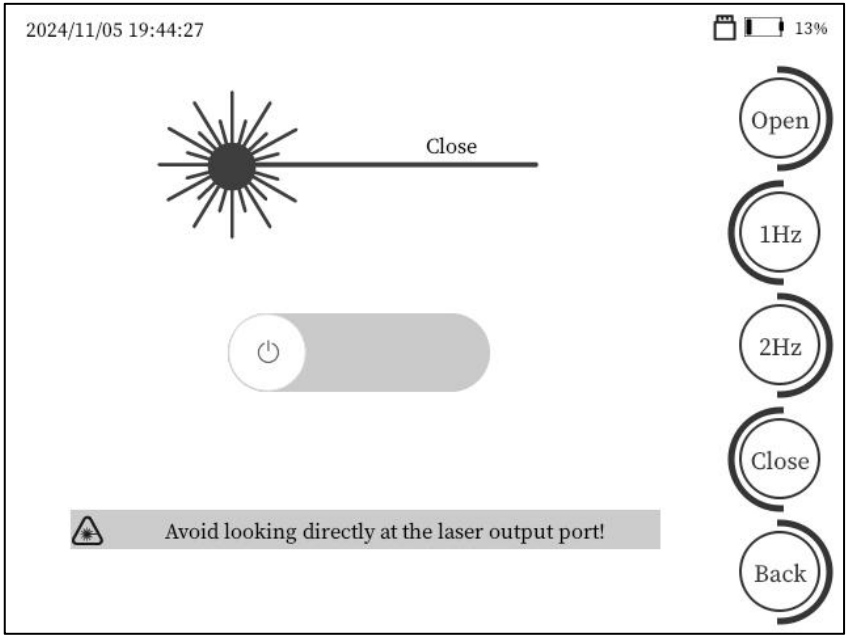
3.8 Visual Fault Locator (VFL)

On the main menu interface, press the [VFL] icon to enter the visible light source interface.

Press the [Open] menu, the red light is turned on, continuous light output; press [1Hz] or [2Hz], the red light output modulated light with a frequency of 1Hz or 2Hz.

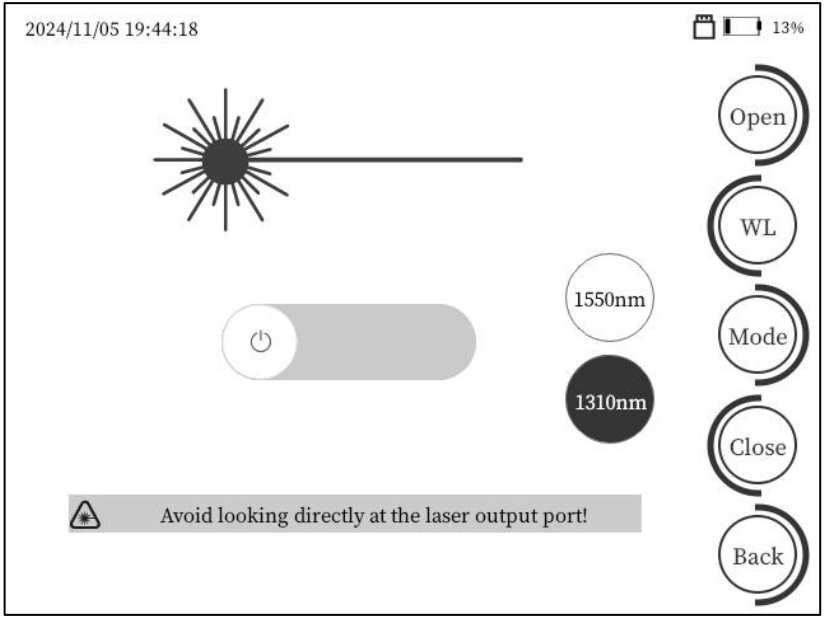
⚠ warning:

Avoid looking directly at the laser output port, the laser will cause damage to human eyes!

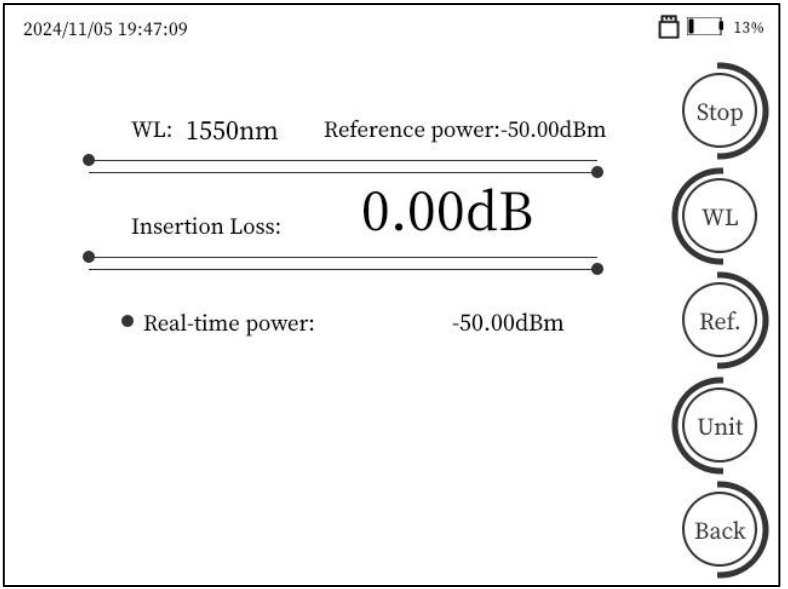


3.9 Laser Source (LS)

On the main menu interface, press the [Laser Source] icon to enter the stable laser source test interface. The output optical interface and output wavelength of the stable laser source function are consistent with the OTDR. The right button selects the functions of turning on the laser source, switching the wavelength, and switching the laser source mode.



3.10 Light Loss



On the main menu interface, press the 'Light Loss Test' icon to enter the light loss test interface.The steps for measuring losses are as follows:

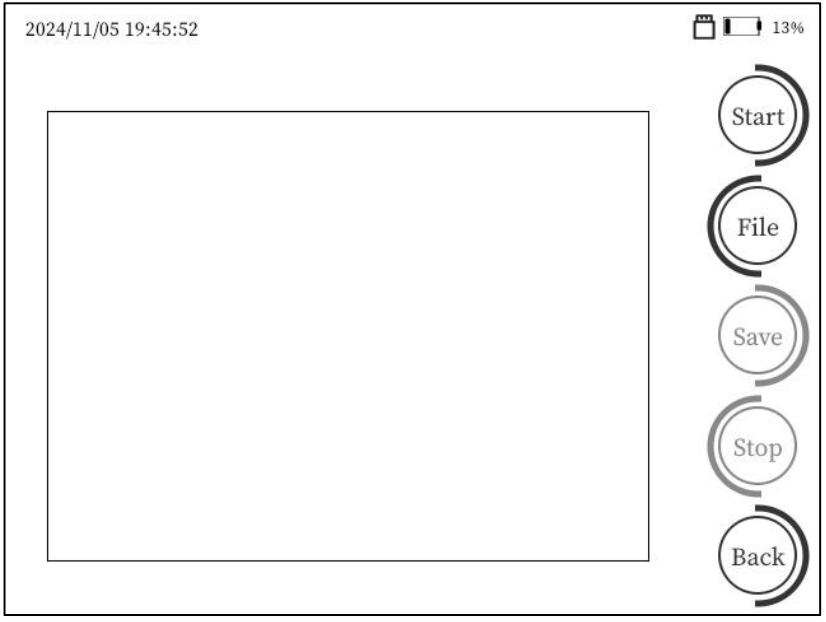
1) Connect LS and OPM optical interfaces with standard jumpers, press 【 Start 】, and after the power stabilizes, press 【 Reference 】;

2) Connect the tested component to the LS and OPM optical interfaces using standard jumpers, and press 【 Start 】 to obtain the insertion loss of the tested component.

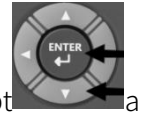
The above operation can also be completed through 【 F1 】 - 【 F5 】.

3.11 Microscope

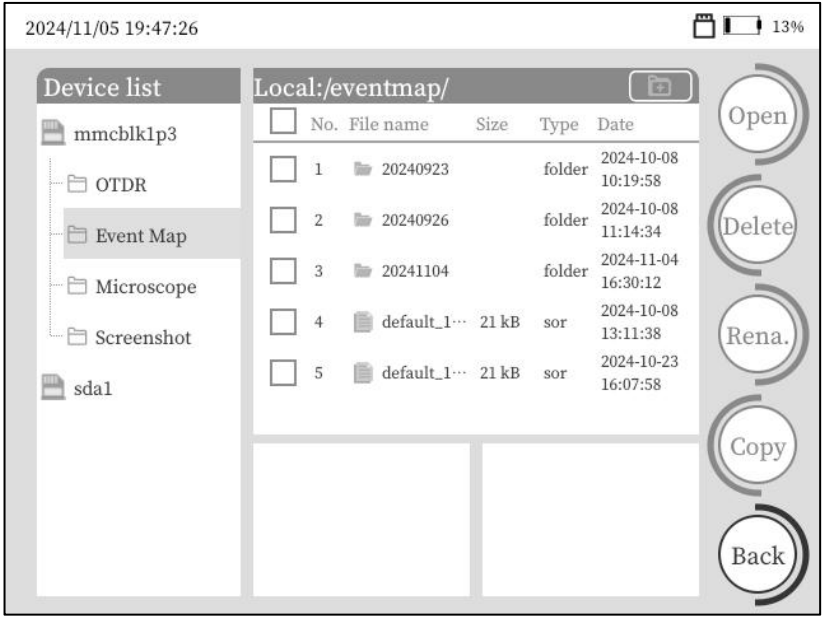
Operation method: Insert the USB connector of the end face tester, click [Start] to complete the test, click [Stop] first, and then unplug the USB.



3.12 File

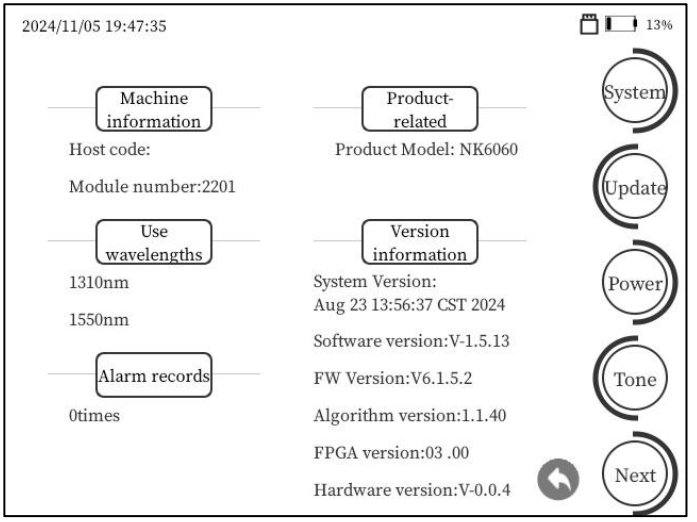
On the main menu interface, press the 'File Management' icon to enter the file management interface. It is possible to open, rename, delete, and copy data files stored in the instrument to a USB drive. Adopt 

and [F1] - [F5] can also complete the opening, copying, pasting, and deleting of files.



3.13 Settings

On the main menu interface, press the 【 Settings 】 icon to enter the system settings interface.



Includes: system information, software updates, power-saving management, sound, connection, date and time, language settings, factory reset, storage, boot password, network and other functions.

System information: including host number, module number, product model, wavelength used, and software version alarm records.

Software update: Upgrade using a USB flash drive. You can also upgrade by pressing the [ENTER] button.

Power saving management: can adjust screen brightness and standby time.

The brightness can be adjusted by pressing the ▲ and ▼ keys;

By pressing buttons and adjusting the standby time.

Tone: Control touch sound, button sound, alarm sound.

Connect: Bluetooth and Type-C can be turned on.

Bluetooth can be turned on/off by pressing the ▲ and ▼ keys;

Type-C can be turned on/off through buttons.

Date time: Adjust the time.

Language: Switch languages.

Press the【ENTER】button to adjust the language using the ▲ and ▼ buttons;

Then press【ENTER】to confirm.

Reset: Restore to default factory settings.

Press the【ENTER】button to reset to factory settings.

Store: View the usage status of storage space.

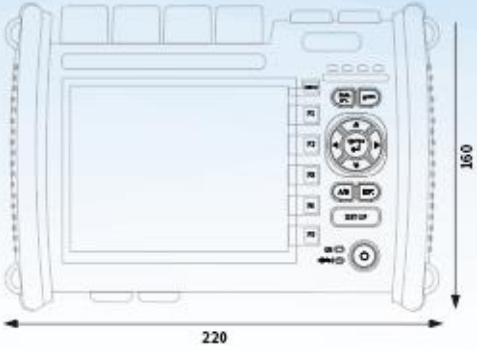
Lock: Set the power on password.

The startup interface can input the password by pressing the ▲/▼//and【ENTER】keys.

IP: Set the IP and port number, and enable remote testing. Press【ENTER】to perform remote testing, and then press【ENTER】to start the listening service.

External dimensions

Unit: mm



If not specified, the tolerance is ±3%.

However, in cases of less than10mm, the tolerance is ±0.3mm.

All-In-one handheld fiber optic network test tool

Smart-OTDR

Content is subject to change without notice!